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Introduction à la Théorie des Explosifs. Par M. E. SARRAU, Ingénieur en Chef des Poudres et Salpêtres, Membre de l'Institut. Paris, Gauthier-Villars et Fils, 1893. 115 p.

To the student of applied and theoretical mathematics this work of the eminent M. E. Sarrau will be most welcome. Unfortunately our language can boast of but little on the mathematical theory of explosives, and that little mainly in isolated chapters, imperfect and confusing in their briefness. Whether this be due to lack of interest or of study, we do not care to discuss, but certain it is that for a clear exposition of mathematical thought we must turn to writers of other lands than ours. From France we have received many of our best works, and it is with pleasure that we now announce this new work from the hand of M. E. Sarrau. A prefatory note, four lines in all, states the author's intention to bring forward such mechanical, thermo-chemical, and thermodynamical problems as are necessary to a comprehensive theory of explosives. Throughout, the discussion, which is both analytical and general, is so clearly and concisely accomplished as to be quite within the understanding of any student versed in differential and integral calculus. The first chapter treats analytically of the mechanical principles, including work, kinetic energy, and potential energy. In the second chapter are established the general laws of gases, Mariotte's, Gay-Lussac's, the law of specific volume, the hypotheses of Avogadro and of Ampere, the molecular and atomic weights, the molecular volumes, and the chemical formulæ. In this same chapter are studied the laws governing the specific heat of gases and the laws of gaseous mixtures. Chapter III. treats of the thermo-dynamics of perfect gases, and Chapter IV. of the general principles of thermo-dynamics, including thermal phenomena, equivalence, and the principle of Carnot-Clausius. Chapter V. is devoted to liquids, the law of compression, and the equations of Van der Waals and Clausius. The preceding theories and principles are applied in Chapter VI. to the various transformations, first without change in physical state and then with change from one state (of pressure, tempera-

ture, and volume) into another. The nature of heat is discussed in Chapter VII., and the heat theory of chemical reactions in Chapter VIII. Chapter IX., the last in the book, contains a study of dissociation, theoretical and practical. It will be noticed that the author has confined himself strictly to his outline as planned, and the work is, as the title indicates, merely an introduction to the further and advanced study of explosives, but it is such an introduction as comes from a master hand, and is suggestive of latent power and of the ability to pursue the demonstration to its completion.

C. P.

THERE will be given at the gallery of the Boston Art Club, under the auspices of the Appalachian Mountain Club, from the 6th to the 24th of May, a remarkable exhibition of mountain photographs by Vittorio Sella of Biella, Italy. In addition to the exhibit (327 subjects) to which the "diploma of honor and large gold medal" has just been awarded at the competitive exhibition in Turin, it is expected that nearly two hundred other subjects will be represented, making it the most extensive exhibition of Sella's work ever given. The collection will fully represent the mountains of Dauphiny, Switzerland, the Tyrol, Sicily, and the Caucasus.

—Lieutenant Peary of the United States Navy, during his coming expedition to northernmost Greenland, will record observations of the aurora, upon a plan that will enable comparisons to be made in detail with records from other localities. The plan is already in operation, upon an international basis, and the results are proving to be important. Numerous observers widely distributed are desirable, and, inasmuch as even those who have no special technical knowledge may make entries that will be of value, any who feel so disposed may coöperate. Further information and supplies of blanks may be obtained from M. A. Veeder, Lyons, New York, U.S.A., who will be glad to receive, also, any records of observations of the aurora whatever, for purposes of comparison.

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Texas Plants. I will collect sets of plants represented in this region of Texas, either for sale or for exchange for literature, for anyone who will send me an order in time to fill it. Plants to be ready complete in November. C. F. Maxwell, Box 174, Dublin, Texas.

For sale or exchange—A Telescope (36 diameters, copper barrel)—for \$20 cash or scientific books of that value. A. N. Somers, La Porte, Ind.

For sale—A complete set of the Reports of the Second Geological Survey of Pa., 1874-1893, including the Grand Atlas. Publisher's price over \$115. Will sell for \$50. Address F. D. Chester, Newark, Del.

The undersigned has skins of Pennsylvania and New Jersey birds, as well as other natural history specimens; which he wishes to exchange for marine, fresh water, and earthworms of the South and West. Correspondence with collectors desired. J. Percy Moore, School of Biology, University of Pennsylvania, Philadelphia.

For sale or exchange.—I have a Caligraph typewriter (No. 2) in perfect order and nearly new. It is in a heavy leather, plush-lined office case, the whole costing me about \$100. I desire to obtain for it, either by sale or exchange, a new, No. 5 "Kodak" camera, with six double feather-weight plate-holders and the latest pattern of their tripod. The lens and pneumatic time-shutter must also be the same as those now sold with the last No. 5 Kodak. The price of what I desire in exchange is \$78. Address, for particulars, P. O. Box 314, Takoma, District of Columbia.

For sale.—An Abbe binocular eye-piece for the microscope. Alfred C. Stokes, 527 Monmouth St., Trenton, N. J.

For sale or exchange.—One good long range Remington B. L. rifle, 44 calibre, also land and fresh water, and marine shells. Want shells, Safety, camera or printing press. A. H. Boies, Hudson, Mich.

Fine collection of microscopic slides for sale, or would exchange for first-class pneumatic bicycle. J. E. Whitney, Box 549, Rochester, N. Y.

For sale—A Zentmayer new model U. S. Army Hospital monocular stands. Price \$110, will sell for \$75. Address H. C. Wells, No. 151 Broadway, New York.

Wants

WANTED, as principal of a flourishing technical school, a gentleman of education and experience who will be capable of supervising both mechanical and common school instruction. Special familiarity with some technical branch desirable. Address, giving age, qualifications, etc., J. B. Bloomingdale, Fifty-ninth street and Third avenue, N. Y.

WANTED.—A young man as assistant in our microscopical department. Queen & Co., Philadelphia.

THE undersigned desires specimens of North American Gallinae in the flesh for the study of their pterylosis. These species are especially desired: *Colinus ridgwayi*, *cyrtonyx montezumae*, *deudragapus franklini*, *lagopus velchi*, *tympanuchus cupido* and *pedioecetes phasianellus*. Any persons having alcoholic specimens which they are willing to loan or who can obtain specimens of any of the above are requested to communicate with Hubert Lyman Clark, 3922 Fifth Avenue, Pittsburgh, Pa.

A COMPETENT TEACHER of botany in college or university is open to engagement. Address L., Box 86, Rochester, Mich.

CAN any one inform me as to the age to which cats have lived? I have one twenty years old. Edward D. Webb, 132 W. Eighty-first St., New York.

WANTED—Second-hand. Foster's Physiology, Balfour's Comparative Embryology, Claus & Sedgwick's Zoology, Flower's Osteology of Mammalia, Vine's Physiology of Plants. Please state editions and prices asked and address Richard Lees Brampton, Ontario, Canada

A GRADUATE ENGINEER will give instruction evenings in geometry, trigonometry and surveying, mechanics, physics, mechanical drawing and general engineering construction. Five years' experience in field and editorial work on engineering journal. References furnished. C. S. H., 102 Tribune Building, New York.

WANTED.—By well-qualified and experienced science master and associate of the Royal School of Mines, London, aged 26 (at present in England), a mastership in technical college or university for any of the following subjects: Engineering sciences, geology and mineralogy, physics, chemistry and metallurgy, etc., etc. Can provide excellent references and credentials. Apply, J. G., 17 Sussex St., Rochdale, England.